

**PJM Generator Interconnection  
W3-047 Front Royal 500 kV  
60 MW Capacity / 39 MW Energy  
Feasibility Study Report**

*January 2011  
DMS #628922v1*

## Introduction

This Feasibility Study has been prepared in accordance with the PJM Open Access Transmission Tariff, §36.2, as well as the Feasibility Study Agreement between Interconnection Customer (IC), and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is Virginia Electric and Power Company.

## Preface

The intent of this Feasibility Study is to determine a plan, with preliminary cost and construction time estimates, to connect the subject generation interconnection project to the PJM network at a location specified by IC. As a requirement for interconnection, IC may be responsible for the cost of constructing Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM and the underlying system. All facilities required for interconnection of a generation interconnection project must be designed to meet ITO technical specifications.

The Feasibility Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. IC is responsible for its right of way, real estate, and construction permit issues.

## General

Queue W3-047 is an IC 39 MW energy increase and a 60 MW Capacity increase to prior queue requests V2-030 and V4-018. W3-047 brings the total energy output of the combined queues to 1464 MW energy and 1350 MW Capacity. The new 3x1 combined cycle gas facility will be located in Warren County Virginia on ITO facilities. The requested in-service date is April 2015. The project was studied with its primary interconnection point at Front Royal 500 kV substation. Project W3-047 was evaluated for compliance with reliability criteria for summer peak conditions in 2014.

## **Network Impacts:**

### **Generator Deliverability**

*(Single or N-1 contingencies for the Capacity portion only of the interconnection)*

No problems identified.

### **Multiple Facility Contingency**

*(Double Circuit Tower Line Contingencies only with full energy output. Stuck Breaker and Bus Fault contingencies will be applied during the Impact Study)*

No problems identified.

### **Contribution to Previously Identified Overloads**

*(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have % allocation of cost responsibility which will be calculated and reported for the Impact Study.)*

No problems identified.

### **Contribution to Previously Identified System Reinforcements**

*(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)*

None.

### **Short Circuit**

*(Report Overdutied breakers here)*

No problems identified.

## **ITO Analyses**

ITO assessed the impact of the proposed queue project W3-047 interconnection of an additional 60 MW of Capacity on the ITO transmission system. The system was assessed using the summer 2014 RTEP case provided to ITO by PJM, where the proposed generation capacity was injected on the 500kV transmission line between the Meadow Brook and Morrisville substations at the location of the previous V4-018 and V2-030 queue projects. This analysis did include the impacts of the generation capacity for all higher order queue generators within the ITO transmission system. When performing a generation analysis, ITO main analysis will be load flow study results under single contingency (both normal and stressed system conditions) and import/export system conditions. ITO criterion considers a transmission facility overloaded if it exceeds 94% of its emergency rating under normal

and stressed system conditions. For import/export studies, ITO considers a transmission facility overloaded if it exceeded 100% of its emergency rating. A full listing of ITO planning criteria and interconnection requirements can be found in the ITO *Facility Connection Requirements* which are publicly available at: <http://www.dom.com>.

The W3-047 and associated V2-030 and V4-018 studies were performed under the assumption that the PATH line and the MAPP line were in-service.

As part of its generation impact analysis ITO routinely evaluates the impact that a proposed new generation resource will have under maximum generation conditions and stressed system conditions. For the W3-047 evaluation three different assessments were conducted.

- 1) The first being when local generation including the proposed W3-047 facility is operated at their maximum capability. The result of this study is shown below.

No problems indentified.

- 2) The second being a stressed system condition where the largest generator in the area is unavailable. With the W3-047 generator geographically located in Northern Virginia, Possum Point Unit 5 is considered the most critical generating unit in the area. The impact of W3-047 was studied with the outage of Possum Point Unit 5. The result of this study is shown below.

No problems indentified.

- 3) The third being import and export conditions into and out of the ITO system. Any new facility that is interconnected with the ITO system should not significantly decrement First Contingency Incremental Transfer Capability between utilities. The results of these studies can be found in Tables A and B.

Table A: Import Study Results

Import Study Results			
Area	Summer 2014	Summer 2014 with W3-047	Limiting Element
AEP	2000+	2000+	None
APS	2000+	2000+	None
CPL	2000+	2000+	None
PJM	2000+	2000+	None

Table B: Export Study Results

Export Study Results			
Area	Summer 2014	Summer 2014 with W3-047	Limiting Element
AEP	2000+	2000+	None
APS	2000+	2000+	None
CPL	2000+	2000+	None
PJM	2000+	2000+	None

ITO's planning criteria indicates a need to have approximately 2000 MW of import and export capability. The results of these import and export studies are indicate that the proposed generation facility will not impact ITO import or export capability.

**Non-Direct Connection Network Upgrades**

None.

**Attachment Facilities**

The proposed layout and attachment facilities are illustrated below in Figure A. The proposed W3-047 generation will be added to the ITO transmission system through previous generation interconnection queues V2-030 and V4-018. The necessary attachment facilities are included with the previous queues.

**Direct Connection Network Upgrades**

None.

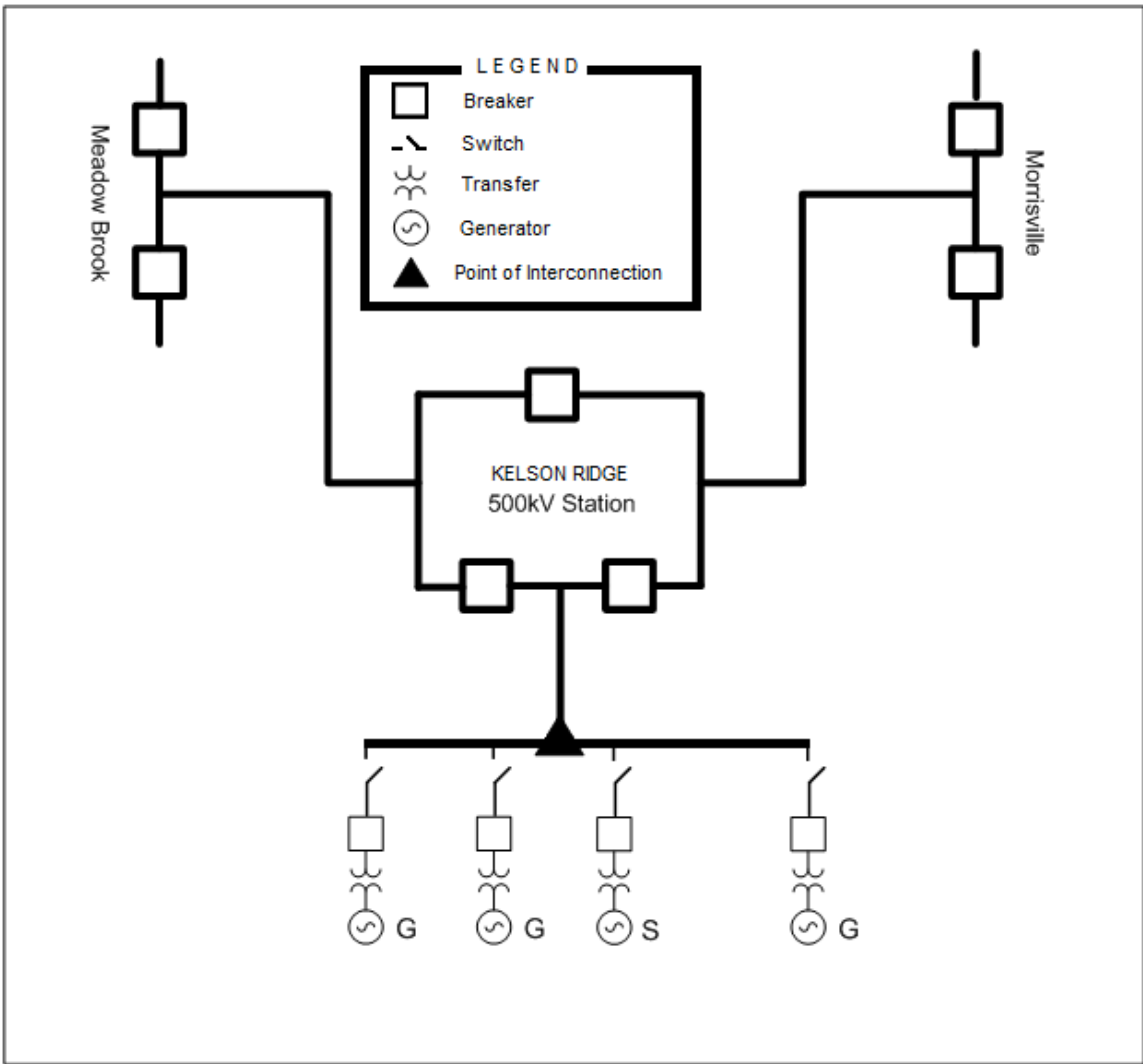


Figure A: W3-047 Layout